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Building CapaCITY/É for sustainable transportation: protocol for an implementation science research program in healthy cities

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ABSTRACT

Introduction Improving sustainable transportation options will help cities tackle growing challenges related to population health, congestion, climate change and inequity. Interventions supporting active transportation face many practical and political hurdles. Implementation science aims to understand how interventions or policies arise, how they can be translated to new contexts or scales and who benefits. Sustainable transportation interventions are complex, and existing implementation science frameworks may not be suitable. To apply and adapt implementation science for healthy cities, we have launched our mixed-methods research programme, CapaCITY/É. We aim to understand how, why and for whom sustainable transportation interventions are successful and when they are not.

Methods and analysis Across nine Canadian municipalities and the State of Victoria (Australia), our research will focus on two types of sustainable transportation interventions: all ages and abilities bicycle networks and motor vehicle speed management interventions. We will (1) **document** the implementation process and outcomes of both types of sustainable transportation interventions; (2) **examine** equity, health and mobility impacts of these interventions; (3) **advance** implementation science by developing a novel sustainable transportation implementation science framework and (4) **develop** tools for scaling up and scaling out sustainable transportation interventions. Training activities will develop interdisciplinary scholars and practitioners able to work at the nexus of academia and sustainable cities.

Ethics and dissemination This study received approval from the Simon Fraser University Office of Ethics Research (H22-03469). A Knowledge Mobilization Hub will coordinate dissemination of findings via a website; presentations to academic, community organisations and practitioner audiences; and through peer-reviewed articles.

STRENGTHS AND LIMITATIONS OF THIS STUDY

⇒ This research programme is unique in its adaptation and application of implementation science in the realm of healthy, equitable and sustainable cities.
⇒ This research aims to understand the key implementation factors for scaling up and scaling out sustainable transportation interventions across different jurisdictions at different stages of implementation.
⇒ This mixed-methods research programme is driven by partnerships with jurisdictions and organisations supporting sustainable transportation from Canada and Australia.
⇒ The study will translate research findings into actionable tools for transportation and urban planners to support greater uptake, and impact, of sustainable transportation interventions.
⇒ The study sites include a range of large and mid-sized jurisdictions but results may not be generalisable to rural or remote communities.

INTRODUCTION

Globally, we are facing health challenges including increases in physical inactivity, chronic diseases and road traffic injury[1]; these are further compounded by rapid urbanisation and climate change.[2] Sustainable transportation, including active modes (walking, wheeling, cycling and other forms of micromobility) and public transit, provides opportunities to improve population health, such as by enabling physical activity participation.[2 3] Changing the design of cities can

play a critical role in simultaneously addressing many of the current health, equity and sustainability challenges. Further, it presents a population-level approach that can have a greater impact than individual-level efforts to encourage behavioural change.[2] However, the private automobile remains the dominant transportation mode in North American and Australian municipalities, while walking, cycling and public transit use remains low.[4–7] This trend stems from a systemic lack of supportive, equitable infrastructure to support sustainable transportation modes in our cities, and the threats that automobiles present to the safety of people using the streets.[8] Without major changes, municipalities will struggle to meet ambitious targets for sustainable transportation (eg, >50% of trips by walking, cycling and transit[9]) to address both congestion and climate crisis.

Sustainable transportation interventions can include infrastructure, programmes and policies to support the uptake of walking, wheeling, cycling and public transit use. These interventions are typically implemented outside the public health sector by a combination of local, regional, provincial/state and federal government actors who determine funding, planning, implementation and construction. Despite evidence outlining the associated health and environmental benefits,[10–12] infrastructural investments are commonly under-resourced and delayed in Canada and Australia. The widespread implementation of sustainable transportation interventions has been thwarted not because of a lack of evidence for the types of interventions that are needed but because of practical (eg, budget, planning, local adaptations, etc.) and political (eg, short political cycles, small vocal opposition, conspiracy theories) hurdles.[13 14]

With the climate emergency in sharp relief, governments are increasingly making investments in sustainable transportation in cities. For example, the Canadian government launched its first National Active Transportation Strategy in 2021 with $400 million for active transportation infrastructure,[15] and also a $14.9 billion investment in public transit over 2021–2028.[16] Meanwhile, the COVID-19 pandemic induced changes at unprecedented rates, massively disrupting travel behaviours and municipal priorities in ways that could accelerate actions to support active transportation.[17 18] To advance healthy cities, we need to systematically close the gap between what is known and what is done. We must identify and address barriers that impede the implementation of evidence-based, sustainable transportation interventions so that we can optimise uptake and benefit, particularly among population groups that face structural challenges to mobility and social participation.

Indeed, many population groups have been historically marginalised from access to power, resources and rights that shape their city, and these inequities persist in transportation and other domains of city life. The Idle No More and Black Lives Matter movements, the pandemic and climate change have shone a spotlight on how negative impacts of crises are unjustly borne by these populations.[19 20] In a transportation context, gender is a key consideration. Women and others in caregiving roles walk more but cycle less; safety concerns in public spaces limit the transportation choices for women and gender minorities; and traditionally women and gender minorities have had little representation in urban planning and transportation engineering.[21 22] To ensure sustainable transportation interventions accelerate progress towards equity, research and practice towards healthy cities must have an explicit focus on equity. This requires placing deliberate and sustained emphasis on the cultures, histories and needs of communities, conducting critical analysis of current systems and structures that perpetuate inequities,[23] along with generating robust data that reflect the experiences and needs of equity-deserving populations.

Implementation science is focused on understanding how interventions or policies come about, how they can be translated to new contexts or scales and who benefits.

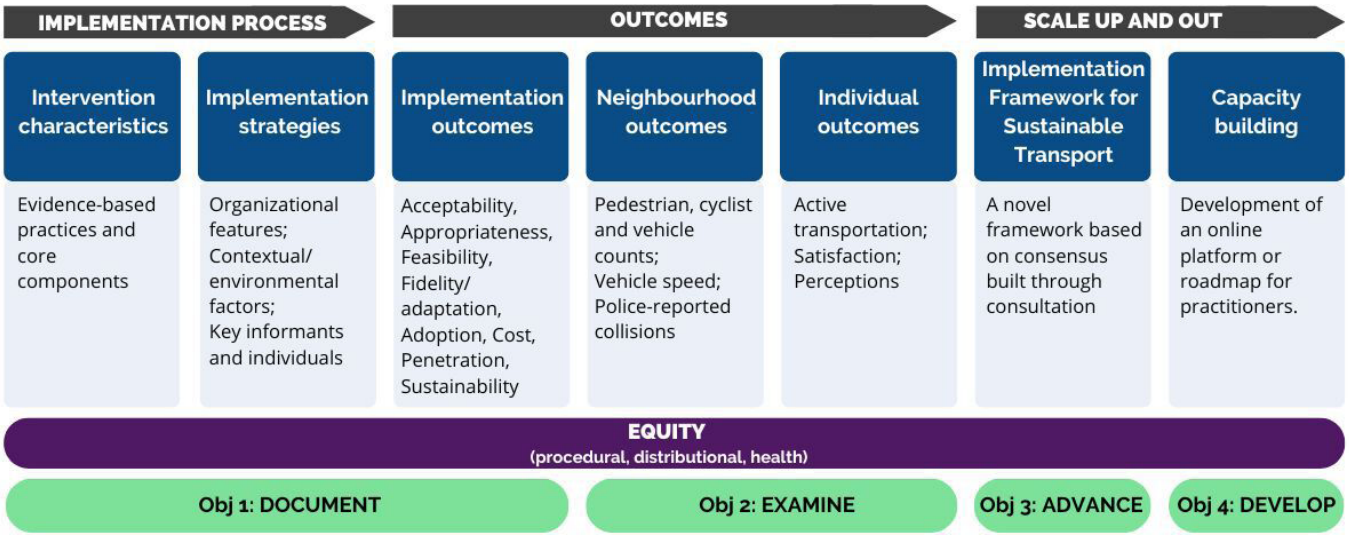

Figure 1 CapaCITY/É project plan.

It has been formally defined as the study of methods to promote the adoption and integration of evidence-based health interventions (eg, tools, programmes and policies) into practice.[24] Most publications in implementation science have been on healthcare interventions or public health programmatic interventions, where context is limited to within an organisation or a small number of organisations. The context of sustainable transportation is quite different, as the interventions themselves are complex and involve multiple actors, and the social, political, economic and environmental contexts span local, regional, provincial/state and federal jurisdictions. Applying and advancing implementation science in the realm of healthy, equitable and sustainable cities offer an opportunity to understand how, why and for whom sustainable transportation interventions are successful (or not) for promoting health and mobility, and how they can be scaled up and out for greater impact.

Little research has developed or used implementation science frameworks for the realm of sustainable transportation interventions. There are several reasons for this paucity of existing literature.[25 26] First, existing frameworks tend to operate at the individual and organisational levels, often oversimplifying factors that operate at community, policy or societal levels.[27] In contrast, sustainable transportation interventions explicitly require an understanding of policy and politics at multiple levels of governance.[28] Second, existing frameworks do not accommodate the complexity of the types of intersectoral solutions required for sustainable transportation interventions, nor the ability to determine the effectiveness of a single intervention (eg, a bike lane) relative to a bundle of interventions (eg, a mobility strategy).[29 30] Third, frameworks often lack attention to equity; while this is a broader problem for the implementation science field, it is an especially critical consideration for solutions towards equitable and sustainable cities.[23] Finally, the scaling up and scaling out of sustainable transportation interventions are challenging, and local sociopolitical factors must be considered when tailoring interventions.[31 32] We consider scaling up to be the broader delivery of a nearly identical intervention to reach larger numbers of a similar target audience. Scaling out is viewed as moving an intervention from one setting to another and/or from one population to another.[33]

CapaCITY/É is a joint Canadian and Australian research programme that aims to advance implementation science research in the realm of healthy, equitable and sustainable cities. It is a mixed-methods research programme across nine Canadian cities and the State of Victoria, Australia. Our work will document how interventions are implemented, determine who is involved or left out of the decision-making process and identify factors facilitating or constraining implementation. We will collect data on the impacts of interventions on equity, health and mobility outcomes, with a focus on the experiences of equity-deserving groups. This work will feed into the development of a novel implementation science

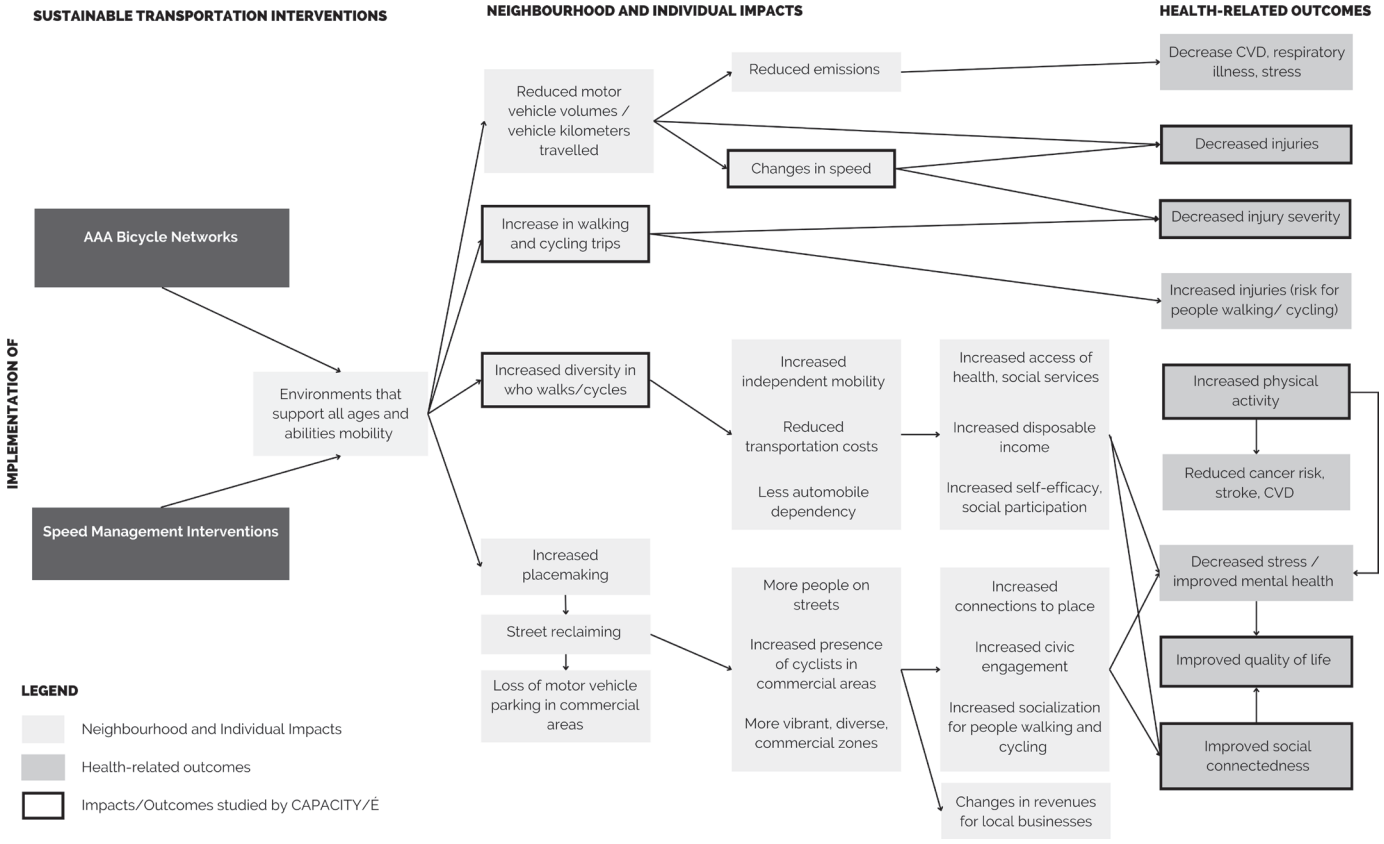

Figure 2 Conceptual model.

Table 1 CapaCITY/É jurisdictions

City	Population size*	Population per km^2*	% LICO-AT†	% Visible minority‡	% Indigenous*	% Public transit	% Walked	% Biked
Toronto	2 794 356	4427.8	17.1%	51.5%	0.8%	37.0%	8.6%	2.7%
Montreal	1 762 939	4833.5	19.2%	34.2%	0.9%	36.5%	8.6%	3.9%
Calgary	1 306 784	1592.4	8.7%	36.2%	3.2%	15.8%	5.0%	1.6%
Surrey	568 322	1797.9	11.8%	58.5%	2.2%	14.9%	2.8%	0.4%
Halifax	439 819	80.3	9.6%	11.4%	3.8%	11.8%	8.2%	1.0%
Saskatoon	266 141	1174.7	7.7%	19.8%	11.5%	5.1%	4.5%	2.2%
Guelph	143 740	1644.1	7.4%	18.8%	1.6%	7.1%	5.9%	1.6%
Kingston	132 485	293.4	9.5%	9.7%	4.2%	8.3%	9.3%	2.4%
Victoria	91 867	4722.3	14.0%	15.2%	5.0%	14.3%	23.3%	11.1%
State of Victoria, Australia§	6 619 863	29.1	7.4%¶	16.2%**	1.0%††	8.8%‡‡	17.0%	2.0%

*Based on the most recent Canadian census data of 2021. Other columns are from 2016.
†LICO-AT refers to low-income cut-offs after tax (Canadian cities (2016 census)).
‡Visible minority refers to whether a person belongs to a visible minority group as defined by the Canadian Employment Equity Act and, if so, the visible minority group to which the person belongs. The Employment Equity Act defines visible minorities as 'persons, other than Aboriginal peoples, who are non-Caucasian in race or non-white in colour'. The visible minority population consists mainly of the following groups: South Asian, Chinese, Black, Filipino, Latin American, Arab, Southeast Asian, West Asian, Korean and Japanese.
§Ref: https://dbr.abs.gov.au/region.html?lyr=ste&rgn=2.
¶Lowest quintile of income (Australia-wide) for 2019–20. Ref: https://www.abs.gov.au/statistics/economy/finance/household-income-and-wealth-australia/2019-20.
**This is defined as the proportion of the population born in South-East Asia, North-East Asia, Southern and Central Asia, Americas, in Greater Melbourne in 2021. Ref: https://dbr.abs.gov.au/region.html?lyr=gccsa&rgn=2GMEL.
††Aboriginal and Torres Strait Islander Peoples in Greater Melbourne. Ref: Australian Bureau of Statistics. Victoria: Aboriginal and Torres Strait Islander population summary (Internet). Canberra: ABS; 1 July 2022 (cited 2023 October 25). Available from: https://www.abs.gov.au/articles/victoria-aboriginal-and-torres-strait-islander-population-summary.
‡‡2020 travel survey data in Greater Melbourne and Geelong (not the entire state of Victoria) and reflects the proportion of trips, Ref: https://transport.vic.gov.au/about/data-and-research/vista and https://public.tableau.com/app/profile/vista/viz/VISTA-Trips-timeseriesAccess/Trips-methodoftravel.

framework suitable for sustainable transportation interventions and rooted in equity. Finally, we will link the framework to tools for use by transportation and urban planners, to support scale-up and scale-out of sustainable transportation interventions across Canadian and Australian jurisdictions and, more broadly, to strengthen the capacity for implementation science in the healthy cities' realm.

METHODS AND ANALYSIS

Study setting and aims

The overarching goal of CapaCITY/É is to catalyse the implementation of sustainable transportation interventions to support health, mobility and equity in cities. We focus on two types of sustainable transportation interventions: all ages and abilities (AAA) bicycle networks and motor vehicle speed management interventions. To achieve this goal, we have four specific objectives (figure 1): (1) **document the implementation process and outcomes** of two types of sustainable transportation interventions; (2) **examine the equity, health and mobility** impacts of these sustainable transportation interventions, both within and between jurisdictions; (3) **advance implementation science** by developing a novel, evidence-based, equity-focused, sustainable transportation implementation science framework; and (4) **develop tools** for scaling up and scaling out of sustainable transportation interventions to build capacity in partner jurisdictions and beyond.

Interventions

Our interest is around sustainable transportation interventions that support health, mobility and equity in cities. Such interventions support *uptake in the use* of sustainable transportation, as well as *diversity in who uses* it. Our major focus is on two types of evidence-based interventions that many Canadian and Australian jurisdictions have underway or under consideration: AAA bicycle networks and motor vehicle speed management interventions. At their core, these interventions aim to create street designs that support mobility for people of AAA. The interventions are also inter-related and have some shared pathways to health and mobility (see figure 2).

AAA bicycle networks

People living in Canada make over 131 million bicycle trips annually,[34] and around 4 million Australians

Figure 3 CapaCITY/É jurisdictions.

(~15%) ride a bike in a typical week.[6] Cycling is an accessible and sustainable transport mode that can facilitate mobility across age, gender, race, ability and economic circumstances.[35] Increased cycling creates opportunities for physical activity and the prevention of chronic disease and improves well-being, social connections, place attachment and civic engagement.[10 21] There are also indirect benefits to the non-cycling population, such as improvements in sustainability, liveability and local commerce; reductions in motor vehicle congestion, noise and air pollution; and climate change mitigation.[21] Despite known benefits, cycling is underused in Canada and Australia, particularly among women, older adults, persons experiencing disability and racialised people.[35 36] 'AAA' refers to cycling facility types that are safe and comfortable for AAA through the provision of connected networks of bicycling infrastructure.[37–40] In implementation science terminology, the core components of the intervention relate to quality (AAA) and access (network). Engineering design guidelines specify AAA facility types as protected bike lanes, off-street paths and local street bikeways; painted bike lanes or shared lanes for bikes and motor vehicles are not AAA facilities.[37–40] AAA facility types offer the greatest safety benefits.[41–44] These types of routes are preferred, especially by inexperienced bicyclists, risk-averse individuals, women, people with children, people experiencing disability, and younger and older cyclists.[41 42 45–47] Connectivity also matters. Networks of bicycle facilities are needed to encourage more cycling.[48 49] The network terminology implies a density of AAA facilities (easy access) and connectivity of AAA facilities (accessibility to destinations). As a network, the connected, convenient and comfortable conditions of AAA facilities must connect downtown cores to suburbs, shops, services, schools, employment, transit, community centres, playgrounds and parks.

Speed management interventions

The WHO has identified 30 km/hour as the maximum speed standard municipalities should adopt to achieve safe, sustainable and just mobility.[50–52] Motor vehicle speed increases collision risk and injury severity among all road users, particularly for people who walk, wheel and cycle, with even more importance for younger and older people.[53–56] For instance, a collision with a car travelling at 30 km/hour has a 10% risk of severe pedestrian injury, whereas this risk rises to 50% at 50 km/hour.[56] Similarly, the fatality risk for a pedestrian struck at 50 km/hour is five times greater than at 30 km/hour.[55] Moreover, road environments with higher motor vehicle speeds are associated with a negative perception of neighbourhood quality,[57 58] community cohesiveness[59] and a reluctance to engage in active transportation.[60 61] These high-traffic road environments are disproportionate in areas where more people with low incomes and/or racialised communities live; groups that might be less likely driving themselves.[62] Motor vehicle speed management interventions are critical to making roads safe and comfortable for all.[63 64] Speed management interventions can comprise a diverse set of actions including setting and enforcing speed limits and designing roads to

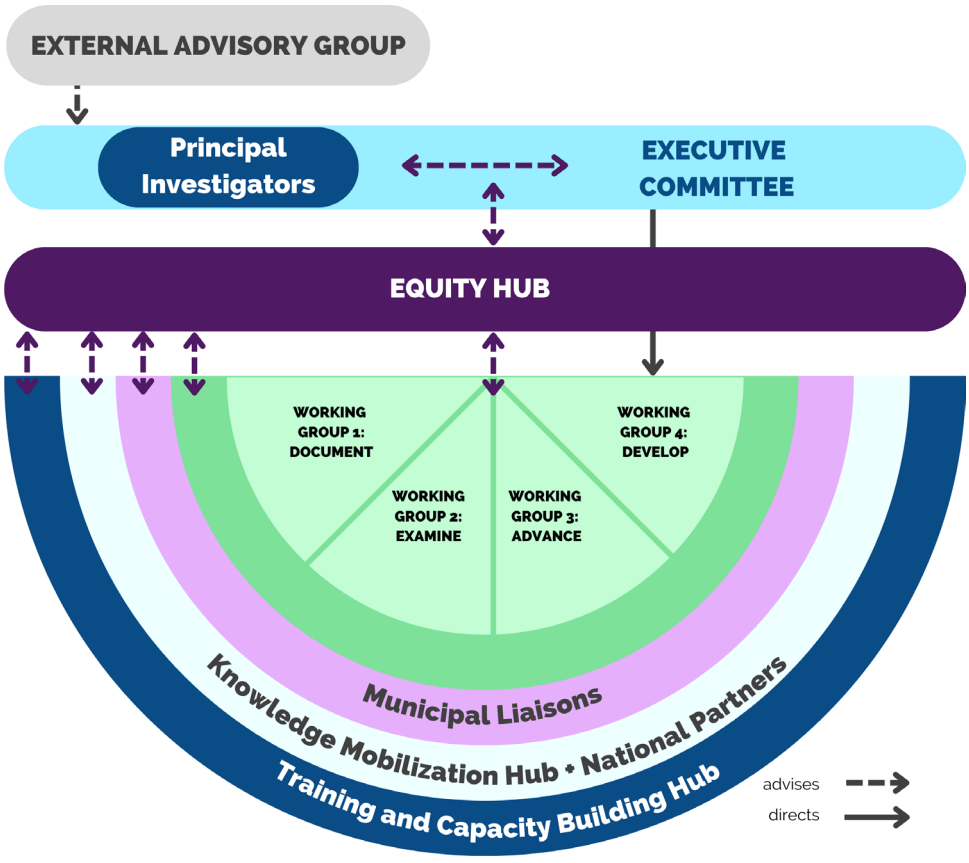

Figure 4 Governance model.

physically regulate vehicle speed. For example, many jurisdictions worldwide have implemented automated speed enforcement programmes including the installation of speed cameras, speed display boards and photo radar, which are known to reduce crashes and fatal and serious injuries.[56] Changes in road geometry and design, more often referred to as traffic calming measures, are also part of the toolkit that municipalities can use and have been proven to be effective not only in reducing speed but also in improving neighbourhood quality of life (eg, noise reduction and air quality improvement).[65]

Settings

CapaCITY/É will study the implementation of these interventions in nine municipalities in Canada (Halifax, Montreal, Kingston, Guelph, Toronto, Saskatoon, Calgary, Surrey and Victoria) and in the state of Victoria in Australia. There may be expansion to other jurisdictions in the course of the work. These jurisdictions were selected given the existing collaborations, for coverage across different geographies and sizes, and as they are at different stages of implementation of AAA bicycle networks and speed management interventions. Table 1 shows the demographic, land area and other characteristics of the chosen jurisdictions; figure 3 shows their location. Currently in our collaborating jurisdictions, the proportion of public transit, walking and cycling as the primary mode of transportation to work is only on average 26% (ranging from ~12% in Saskatoon to ~48% in Toronto and Montreal). To achieve sustainability goals, cities need to achieve mode shares that exceed 80% of trips by sustainable modes.[66]

Study design

CapaCITY/É's work will proceed through four interrelated objectives (see figure 1), with methods and analysis described for each below.

Objective 1: document the implementation process and outcomes of two types of sustainable transportation interventions

This work will document the implementation process and outcomes of AAA bicycle networks and speed management interventions through comparative case studies. In Objective 1.1, we will use data and planning documents from participating jurisdictions to map and describe existing AAA bicycle networks and speed management interventions as they are implemented. Core to implementation science is the study of fidelity and adaptation. Assessing how interventions may vary from what is planned to what is actually built (fidelity) and how interventions might be adapted is central to understanding intervention implementation and effectiveness. In Objective 1.2, we will document the implementation process and assess implementation outcomes through a document analysis and a series of key informant interviews for each

jurisdiction. Preliminary interviews with municipal partners will be conducted to inform the parameters for the document analysis for each intervention and to provide guidance for setting the boundaries for each jurisdiction's case studies. A document search will then assist with outlining the implementation process for each case study. Findings from Objective 1.1 will be combined with findings from the document analysis and used to generate discussion with key informants in each jurisdiction about implementation outcomes. We will perform a deductive content analysis for each intervention within a jurisdiction, linking maps, descriptions and factors influencing the implementation processes and outcomes. Integrative findings on factors that influence each jurisdiction's intervention implementation process and outcomes will be inputs to the development of an implementation science framework (see Objective 3). Consistent themes across the jurisdiction with the same intervention type will be noted, and then, consistent themes between the two types of interventions will be documented. Dissimilarities across jurisdictions and interventions will also be explored.

Objective 2: examine equity, health and mobility impacts of these sustainable transportation interventions, both within and between jurisdictions

This work will document the distributional equity of the interventions and individuals' experiences of interventions. We will also examine the differential impacts of interventions on health and injuries, mobility and neighbourhood satisfaction, overall and across equity-deserving populations, within and between jurisdictions.

In Objective 2.1, we will assess the spatial patterning of interventions relative to where equity-deserving populations live. We will overlay the location of interventions with census sociodemographic data to cover periods before and after interventions were implemented. Adapting spatial modelling approaches used by our team,[67–69] we will determine if inequities in spatial access to interventions exist and how these inequities change with the implementation of interventions. We will fit separate models for each city using outcomes describing the intervention (eg, coverage of AAA bicycle networks or 30 km/hour speed limit), sociodemographic indicators as predictors and an interaction between time and equity indicators. Relevant covariates will be included (eg, population and residential density). To provide in-depth insight on who benefits, we will also conduct a community survey and focus groups. These surveys will sample the population living near interventions and will assess familiarity, perceptions, use of, perceived accessibility and satisfaction with recent intervention implementation. Focus groups will permit a deeper dive into the experiences of equity-deserving populations.

In Objective 2.2, we will examine the impact of the interventions on health and mobility outcomes at the neighbourhood level (drawing on partner-provided secondary data on pedestrian, cyclist and vehicle counts, vehicle speed and collisions for the jurisdictions) and individual level (using the community surveys), as well as differential impacts across population groups.

Objective 3: advance implementation science by developing a novel, evidence-based, equity-focused, sustainable transportation implementation science framework

This work aims to advance implementation science by developing an implementation science framework suitable for sustainable transportation interventions. This framework will aim to capture complex intersectoral solutions, put substantial attention to larger contextual factors (policy, politics and governance) and, importantly, provide guidance to reduce inequities within jurisdictions.

In Objective 3.1, we will develop a draft framework, via a scoping review and partner consultation. The scoping review will compile frameworks from the fields of implementation science, sustainability transitions, political science and other disciplines that identify elements to take forward in the consultation phase. We will look closely at how they attend to equity (procedural, distributional and health). Then, we will coalesce findings from the scoping review, as well as learnings from consultation with research team members and partners to draft an initial implementation science framework for sustainable transportation. We will then use a Delphi process[70–73] to engage partners in confirming constructs and refining the framework. We will invite city liaisons, key informants, national partners, equity-deserving groups and provincial and national funders to participate.

In Objective 3.2, we will explore the application of the new framework through a series of case studies in specific jurisdictions. For each jurisdiction, we will map available data onto the different constructs of the framework. This work will identify data gaps, highlighting the need for either new data collection or revisions to the framework. In our analysis, we will integrate findings across the jurisdictional case studies. As the jurisdictions vary by size, political context and stage of intervention implementation, we expect to be able to detect differences as we populate the framework.

Objective 4: develop tools for scaling up and scaling out of sustainable transportation interventions to build capacity in partner jurisdictions and beyond

This work will support the uptake of the framework among practitioners and researchers to promote the scaling up and out the specific interventions (ie, AAA networks or speed management interventions, into other settings) and for other types of sustainable transportation interventions (eg, public transit interventions, like Bus Rapid Transit).

In Objective 4.1, we will conduct an environmental scan of tools that have the potential to measure the

constructs of our framework. The scan will define categories of tools consistent with the framework, identify which tools are being used by municipalities and whether and how the tools assess equity (procedural, distributional and health). Then, we will invite municipal liaisons, as well as key informants, national partners, community members from equity-deserving groups and provincial/state and national funders, to participate in reviewing the environmental scan results and complete an online survey to assess their perceptions of the applicability of each tool and the barriers within local contexts.

In Objective 4.2, we will develop an online platform that can guide municipalities towards the best combination of tools depending on user contexts. We will organise a design thinking workshop[74] with our municipal liaisons and national partners to develop a working prototype of the platform. Participants will receive a package to become familiar with the framework (Objective 3.2) and the tools (Objective 4.1). During the workshop, participants will collaboratively work on how tools can be useful for different implementation outcomes, across various contexts (city size, priorities and resources), and offer insights on how these tools should be adapted, refined and put into practice. The workshop learnings will be used to refine the online roadmap before launching it on the CapaCITY/É website.

Objective 4.3 will focus on the promotion and evaluation of the online platform. This work involves direct engagement with practitioners to understand its use for scaling up or scaling out sustainable transportation interventions. We will work with five municipalities interested in using the platform to provide training sessions to municipal staff and their partners and monitor how the platform is integrated into cities' planning and evaluation. Key performance indicators will include measures of use and uptake, level of integration of the online roadmap into municipal processes, usage of tools in the online roadmap and user satisfaction. To assess the scaling out potential of the online roadmap, we will also seek out two municipalities working towards implementing other sustainable transportation interventions and make adaptations based on learnings.

Study contributions and limitations

CapaCITY/É is working towards a vision to accelerate a dramatic increase in the number and diversity of people using sustainable transportation in Canada and Australia. To achieve this vision, we are undertaking research that aims to understand the key implementation factors for scaling up and scaling out of sustainable transportation interventions across different contexts, to support health, mobility and equity goals.

Municipal and state governments and national organisations in the sustainable transportation space have been our partners since the ideation and through the development of the CapaCITY/É research programme. These collective conversations emphasise that there is an unmet need for support on how best to implement sustainable transportation interventions at the local level. This resarch will develop and use implementation science framework to better support their use around sustainable transportation interventions. Our work will advance healthy cities' implementation science by considering the complexity of the multilevel and intersectoral systems within which sustainable transportation interventions are implemented and scaled, using an explicit equity-focused lens.

Equity is a rising area of attention in public health, transportation and the broader community, and it requires new approaches and doing work differently.[75] Transparency is important in this journey. At the outset of CapaCITY/É, we are using the language of 'equity-deserving populations'. Terminology has been a subject of debate among the team members (equity-deserving, equity-seeking, equity-denied, equity-owed, structurally marginalised conversations), as well as the broader research and practice community. As we and others undertake work in this area, our terminology may change. In CapaCITY/É, we define equity-deserving populations as population groups (spatial and/or social) that face structural challenges around equitable access and resources related to mobility.[76] Equity-deserving populations often include racialised people, Indigenous people, people experiencing disability, people with diverse body sizes, women and people with diverse gender identities, people with low incomes, children and youth, and older adults. Informed by transportation justice,[77–79] public health perspectives[80] and intersectionality in lived experiences,[81] our work will consider how procedural and distributional inequities in sustainable transportation interventions contribute to inequities in health outcomes. Terminology in the research community may differ from what is used in practice,[75] and so we detail CapaCITY/É's equity terminology: procedural equity is the equitable participation in decision-making, including public participation in the planning processes for sustainable transportation interventions; distributional equity is equitable access, both in terms of where infrastructure is implemented and who has access to it; and health equity examines differences in health-related outcomes between groups, which is rarely done in studies of sustainable transportation interventions.[82]

As a large, multi-site, intersectoral team, we have established a governance structure to enable input into research and knowledge mobilisation activities that will ensure there is uptake in our findings and outputs (figure 4). Research Objective Working groups will be guided by Municipal Liaisons (transportation staff/managers in each of our study jurisdictions who are directly involved in the interventions and operate as principal knowledge users), the Knowledge Mobilisation Hub (which includes professional and community organisations in the sustainable transportation and injury prevention space, including Vélo Canada Bikes, Parachute,

Institute of Transportation Engineers and The Centre for Active Transportation), the Equity Hub (comprised of team members who have specific expertise, either through their research and/or lived experience) and our Training Hub, which has a focus on training and capacity building for healthy cities implementation science, aims to develop scholars and practitioners to work across disciplines and at the interface of research and city building.

The study sites include a range of large-sized and mid-sized jurisdictions, but results may not be generalisable to rural or remote communities. Further, our primary focus is on AAA bicycle networks and speed management inventions, sustainable transportation interventions with established health impacts, which are being implemented across cities in Canada, Australia and others. We think there are applications of our implementation science framework to other popular sustainable transportation interventions across different scales (eg, pedestrian streets and Bus Rapid Transit), which we will explore in workshops in Objective 4. We anticipate other priorities may arise in the course of the project (eg, a rise in micromobility, ride share, delivery or unanticipated shocks such as COVID-19). With knowledge users embedded in the project governance, we hope to be nimble to respond to shifting needs.

Patient and public involvement

None.

ETHICS AND DISSEMINATION

All activities have been approved by the Research Ethics Board at Simon Fraser University (H22-03469), and other university ethics boards depend on the location of research activities. All activities will comply with the Tri-Council Policy Statement: Ethical Conduct of Research Involving Humans[83] (TCPS 2).

Knowledge mobilisation is specifically embedded in each CapaCITY/É's objective, and our plan specifies the role and input of knowledge users within each objective, the knowledge user outputs related to each part of the work and strategies for dissemination and uptake of these outputs. Our outputs will include a website, blog posts, public reports (case studies, maps) tailored to the practice community and conference presentations and publications to reach the larger academic community. CapaCITY/É knowledge mobilisation will be in both official languages (English and French), with many outputs translated to facilitate uptake and engagement.

DATA SUMMARY

Our research project follows a data management plan that includes a plan for data sharing. Data that can be shared publicly will be made available on the Borealis Dataverse (https://borealisdata.ca).

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